Weather and Climate

Gates of the Arctic Summer 2014 Weather Summary

Bettles Summer Weather 2014

It was a wet, cold summer in Bettles. The average temperature for June was 53.9° F compared to a normal of 58.5° F. It was the fourth coldest June since records began in 1951. 3.54 inches of rain fell in June. More than ¼ inch was measured on eight different days. It ended up as the second wettest June on record.

The deluge continued in July, with 5.0 inches of rain for the month. It rained 21 days in July with two, 4-day periods of particularly wet weather: 1.91 inches of rain fell from 7/8-7/11 and 1.26 inches of rain fell from 7/21-7/24. July 2014 was the second wettest on record and the combined June-July period of 8.54 inches broke the old record of 7.05 inches set in 1963. It was cold too – 3.7° F cooler than normal and the 5th coldest July since 1951.

Things eased up a bit in August. Temperatures were warmer than normal for most of the month except for a cold snap the last three days of August. The low temperature for the month was 24° F on August 30. Precipitation was below normal with 1.96 inches in August compared to a normal monthly total of 2.64 inches. (Figures 1 and 2; Tables 1 and 2).

The average summer temperature at Bettles was 54.8° F which is 1.6° F cooler than the 1981-2010 normal. There were more days with measureable precipitation than any other year since records began in 1951. It was the second wettest summer on record. The total summer precipitation was 10.5 inches. For comparison, the normal summer rainfall in Seward is 10.8 inches.

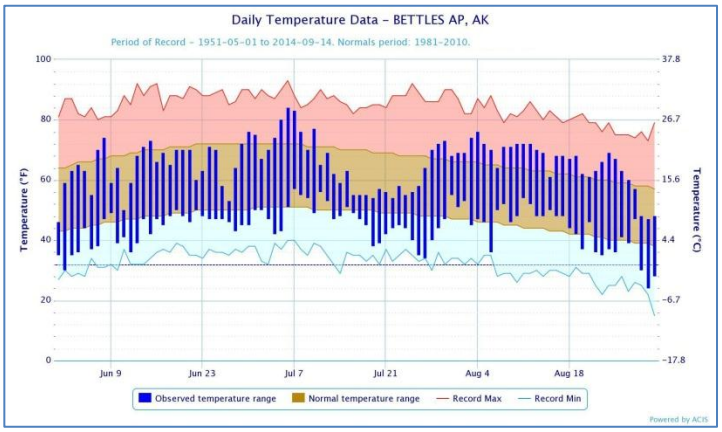

Figure 1. Spring 2014 daily temperatures at Bettles showing record maximum (red), record minimum (blue), normal (brown) and **2014 observed** range (blue bars).

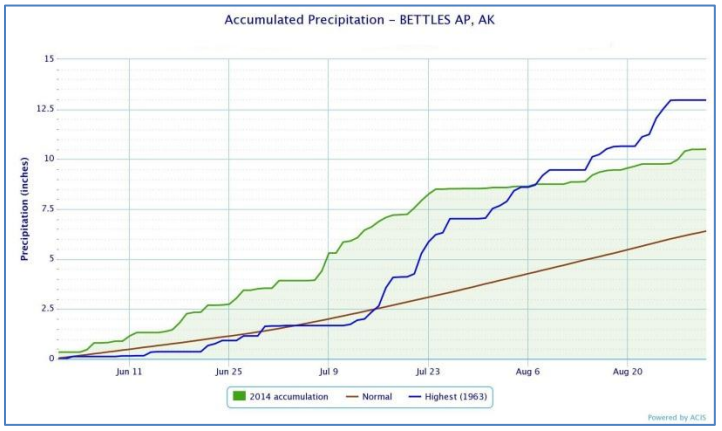

Figure 2. Spring **2014** precipitation at Bettles (green) compared to **normal** (brown line) and **the wettest summer of 1963** (blue).

Table 1. Temperature: Summer 2014 average monthly temperatures compared to the 1981-2010 normal.

Summer 2014	Average Monthly Temp °F	1981-2010 Normal °F	Departure from Normal °F	Monthly High °F / Date	Monthly Low °F / Date
June	53.9	58.5	-4.6	76 / June 30	30 / June 2
July	56.0	59.7	-3.7	84 / July 6	34 / July 27
August	54.5	52.5	+2.0	76 / Aug 4	24 / Aug 30

Summer Season Temperature Departure from Normal: -2.1°F

Table 2. Precipitation: Summer 2014 monthly precipitation totals compared to normal.

Summer 2014	Total Monthly Precip. in.	1981-2010 Normal in.	Departure from Normal in.	Greatest 24 -hr. total in. / Date	# Days with >=0.01 in. water
June	3.54	1.40	2.14	0.46 / June 19	20
July	5.00	2.36	2.64	0.90 / July 9	21
August	1.96	2.64	-0.68	0.42 / Aug 28	18

Summer Season Precipitation Departure from Normal: +4.1 inches (164% of normal).

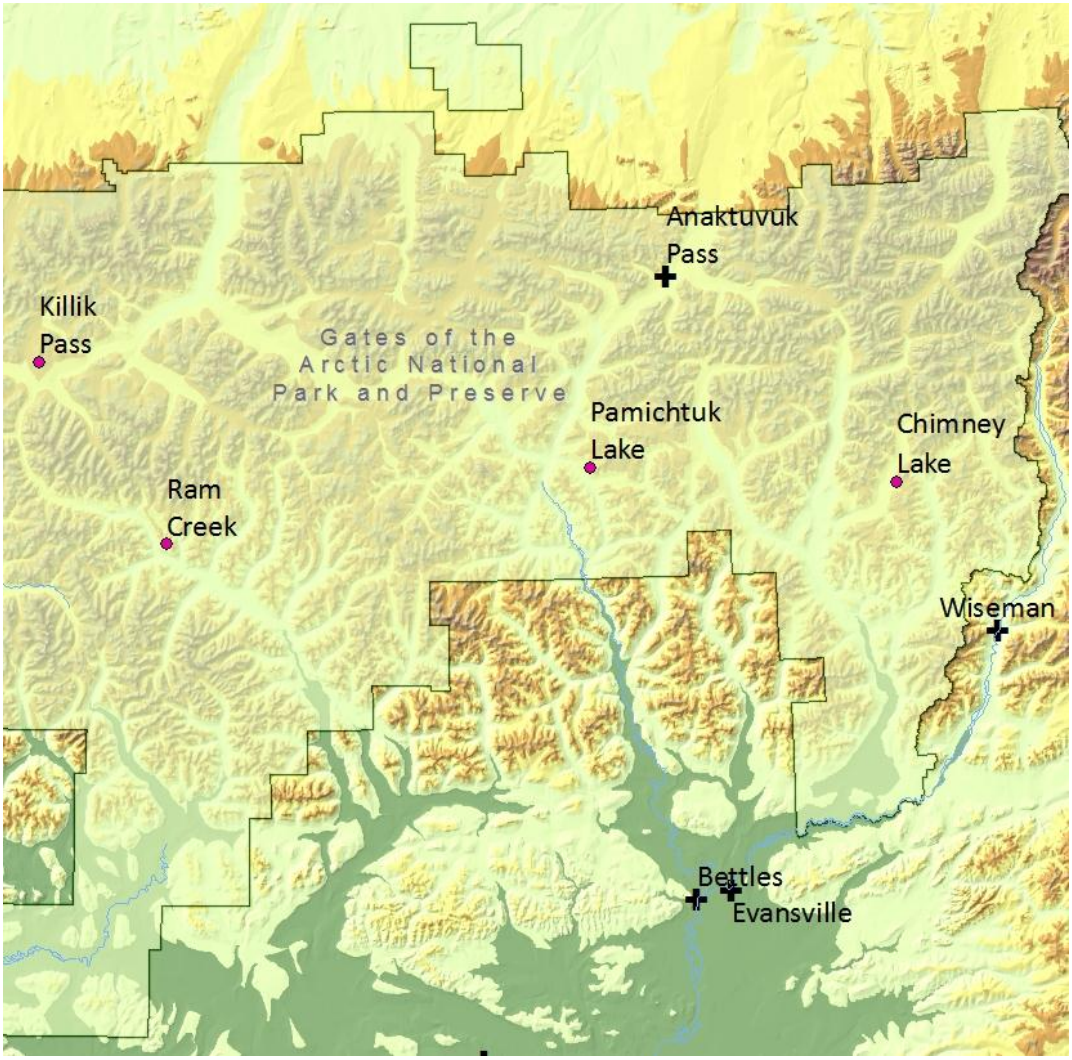

Figure 3. NPS Climate stations in Gates of the Arctic National Park and Preserve.

Table 3. Summary of weather statistics from climate stations in and near Gates of the Arctic National Park and Preserve. All data are preliminary and subject to review. *NPS stations installed in 2012.

Site	Elev. (ft)	Average Temp °F			Rainfall (inches)			Peak Wind Speed (mph)
		June	July	Aug	June	July	Aug	Summer
Umiat	267	46.2	52.0	46.3	1.2	2.7	1.1	33
Wiseman	1180	53.0	54.7	51.8	3.5	4.8	2.1	----
Atigun Pass	4800	39.8	42.3	41.7	5.4	6.7	4.0	----
Anaktuvuk Pass	2103	46.9	50.7	47.6	2.3	2.9	0.5	22
Norutak Lake	800	53.6	55.5	55.7	3.1	3.9	1.3	24
*Chimney Lake	3700	43.8	45.6	44.9	3.4	5.9	2.6	41
*Pamichtuk Lake	3135	45.7	48.5	48.3	3.0	3.3	1.3	45
*Killik Pass	4355	39.7	43.4	43.6	2.0	3.0	0.9	31
*Ram Creek	4100	42.6	45.8	45.3	M	1.8	2.1	39

Interesting notes from RAWS stations:

- June temperatures at the four new GAAR stations (Chimney, Pamichtuk, Killik, Ram) were about 7.5°F cooler in 2014 compared to 2013.

- The temperature fell below freezing in every month at each of the GAAR stations.

- On average, the Killik Pass station is colder than both Umiat and Anaktuvuk Pass in the summer months.

- The calculated lapse rate for the stations in Table 4 (excluding Umiat) is about 3.5°F per 1000 feet in June and decreases to about 3.0°F per 1000 feet in August.

Figure 4. Climate station maintenance at Pamichtuk.

Climate Monitoring in Gates of the Arctic National Park and Preserve

We now have additional NPS climate stations in Gates of the Arctic that complement the long-term record from the National Weather Service station in Bettles. The new NPS stations will provide critical data along a high elevation east west transect across the Central Brooks Range that will help characterize the climate gradients and patterns affecting resources in Gates of the Arctic National Preserve. Table 3 summarizes the summer data for the new sites*.

We have added phenology cameras to some of the climate stations (Figure. 5). These cameras capture images four times per day; the images are downloaded once a year. The images are used to help quantify the snow season, green-up period, and other basic phenologic information.

Figure 5. Phenology camera at Pamichtuk.

Bettles Summer Temperature Trend

The average summer temperature for 2014 was 54.8° F, the 11th coldest summer on record (1951-2014) and 1.6° F cooler than the 1981-2010 climate normal period.

We calculate the average summer temperature by simply taking the average of June, July, and August monthly temperatures. Average summer temperatures show great variability with a range between 53.4° F in 1963 and 61.2° F in 2004.

There has been an overall increase in summer temperatures of 0.27° F per decade over the period of record based on a simple linear regression ($p<0.05$). The 10-year moving average shows the warmest period in the late 1990s. The summer period over the past ten years has been near the long-term average. (Figure 6).

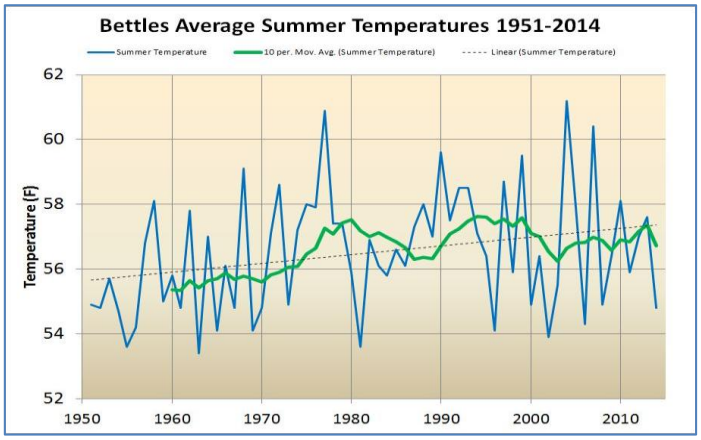

Figure 6. Average summer temperatures (June, July, August) at Bettles since 1951. The green line is a 10-year moving average. The dashed line is a simple linear regression.

Connecting Further

- New paper published – Recent Sea Ice Increase and Temperature Decrease in the Bering Sea area, Alaska
- Previous weather summaries and other climate monitoring documents on the Arctic Network web portal
- Access near real-time data from Western Regional Climate Center and MesoWest
- Statewide summary of weather highlights in the latest Alaska Climate Dispatch from the Alaska Center for Climate Assessment and Policy
- Map of projected temperature and precipitation changes for Gates of the Arctic.

More Information

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